

CLAIMS

1. A semiconductor device comprising:

a semiconductor substrate, having a photodetecting unit formed on one surface, a thinned portion formed by etching a region, opposing the photodetecting unit, of another surface, and first electrodes disposed on the one surface at an outer edge of the thinned portion and electrically connected to the photodetecting unit;

a wiring substrate, disposed to oppose the one surface side of the semiconductor substrate and having second electrodes connected via conductive bumps to the first electrodes; and

a resin, filling a gap between the wiring substrate and the outer edge of the thinned portion to reinforce the strength of bonding of the respective first electrodes and the respective second electrodes with the conductive bumps;

wherein the wiring substrate has formed therein a groove portion that surrounds a region opposing the thinned portion and communicating portions that extend from the groove portion to an exposed surface of the wiring substrate.

2. The semiconductor device according to Claim 1, wherein the communicating portions are second groove portions formed on a surface of the wiring substrate that opposes the semiconductor substrate.

3. The semiconductor device according to Claim 1, wherein the communicating portions are through-holes that pass through the wiring substrate.

4. The semiconductor device according to any of Claims 1

substrate 10, was shown in Fig. 2 and an arrangement, wherein the other ends of the communicating portions (through-holes 27b) are exposed at bottom surface S5, was shown in Fig. 3, the other ends of the communicating portions may instead be exposed at side surfaces S6 of wiring substrate 20 or 21.

[0049] Also, although arrangements, in each of which groove portion 26a or 27a completely surrounds the region of wiring substrate 20 or 21 that opposes thinned portion 14, were described, an arrangement, wherein groove portion 26a or 27a surrounds the above-mentioned region except at portions of the periphery of the region, is also possible.

[0050] Also, although arrangements, in each of which four groove portions 26b and four through-holes 27b are respectively formed in wiring substrate 20 and 21, were described, an arrangement, wherein just one of the groove portions or one of the through-holes is formed, is possible as is an arrangement, wherein two or more of the groove portions or the through-holes are formed.

Industrial Applicability

[0051] This invention concerns a semiconductor device and can be used especially in a back-illuminated semiconductor device.

through 3, wherein the photodetecting unit has a plurality of pixels that are arrayed one-dimensionally or two-dimensionally.

5 5. The semiconductor device according to Claim 1, wherein the wiring substrate has first lead terminals, to which signals that drive the photodetecting unit are provided, and second lead terminals that output detected signals from the photodetecting unit,

and among the plurality of second electrodes, those that are connected to the second lead terminals are positioned inside the region surrounded by the groove portion,

10 among the plurality of second electrodes, those that are connected to the first lead terminals are positioned outside the region surrounded by the groove portion.

15 6. The semiconductor device according to Claim 1, wherein a gas is interposed between the thinned portion of the semiconductor substrate and the wiring substrate.